WHAT IS CLAIMED IS:

1. A carbon fiber composite material comprising an elastomer and a carbon nanofiber dispersed in the elastomer,

wherein the elastomer has an unsaturated bond or a group, having affinity to the carbon nanofiber.

2. The carbon fiber composite material according to claim 1, wherein the elastomer has a weight average molecular weight of 5,000 to 5,000,000.

3. The carbon fiber composite material according to claim 1, wherein the elastomer has, in at least one of its main chain, side chains and terminal chains, at least one member selected from the group consisting of a double bond, a triple bond, α-hydrogen, a carbonyl group, a carboxyl group, a hydroxyl group, an amino group, a nitrile group, a ketone group, an amide group, an epoxy group, an ester group, a vinyl group, a halogen group, a urethane group, a biuret group, an allophanate group, and a urea group.

4. The carbon fiber composite material according to claim 1, wherein the elastomer in the composite

material is in its uncrosslinked form and has a spin-spin relaxation time (T2n) of its network component of 100 to 3,000 μsec as measured at 30°C by the Hahn-echo method using pulsed NMR technique.

5. The carbon fiber composite material according to claim 1, wherein the elastomer in the composite material is in its crosslinked form and has a spin-spin relaxation time (T2n) of its network component of 100 to 2,000 μsec as measured at 30°C by the Hahn-echo method using pulsed NMR technique.

6. The carbon fiber composite material according to claim 1, wherein the elastomer in the composite material is one of natural rubber (NR) and nitrile rubber (NBR).

7. A carbon fiber composite material comprising an elastomer and a carbon nanofiber dispersed in the elastomer, wherein the elastomer in the composite material is in its uncrosslinked form, and has a first spin-spin relaxation time (T2n) of 100 to 3,000 μsec and a second spin-spin relaxation time (T2nn) of being absent or 1,000 to 10,000 μsec, and a fraction (fnn) of components having the second spin-spin relaxation time of

less than 0.2, as measured at 150°C by the Hahn-echo method using pulsed NMR technique.

8. A carbon fiber composite material comprising an elastomer and a carbon nanofiber dispersed in the elastomer, wherein the elastomer in the composite material is in its crosslinked form, and has a first spin-spin relaxation time (T2n) of 100 to 2,000 μsec and a second spin-spin relaxation time (T2nn) of being absent or 1,000 to 5,000 μsec, and a fraction (fnn) of components having the second spin-spin relaxation time of less than 0.2, as measured at 150°C by the Hahn-echo method using pulsed NMR technique.

9. The carbon fiber composite material according to claim 1, wherein the elastomer in the composite material is in its uncrosslinked form and the composite material has a flow temperature higher than the inherent flowing temperature of the elastomer by 20°C or more.

10. The carbon fiber composite material according to claim 1, wherein the carbon nanofiber has an average diameter of 0.5 to 500 nm.

11. A process for producing a carbon fiber

composite material comprising dispersing a carbon nanofiber into an elastomer by shear force,

wherein the elastomer has an unsaturated bond or a group, having affinity to the carbon nanofiber.

12. The process according to claim 11, wherein the elastomer has a weight average molecular weight of 5,000 to 5,000,000.

13. The process for producing a carbon fiber composite material according to claim 11, wherein the elastomer has, in at least one of its main chain, side chains and terminal chains, at least one member selected from the group consisting of a double bond, a triple bond, α-hydrogen, a carbonyl group, a carboxyl group, a hydroxyl group, an amino group, a nitrile group, a ketone group, an amide group, an epoxy group, an ester group, a vinyl group, a halogen group, a urethane group, a biuret group, an allophanate group, and a urea group.

14. The process for producing a carbon fiber composite material according to claim 11, wherein the elastomer in the composite material is in its uncrosslinked form and has a spin-spin relaxation time

(T2n) of its network component of 100 to 3,000 μsec as measured at 30°C by the Hahn-echo method using pulsed NMR technique.

15. The carbon fiber composite material according to claim 11, wherein the elastomer in the composite material is one of natural rubber (NR) and nitrile rubber (NBR).

16. The process for producing a carbon fiber composite material according to claim 11, wherein the carbon nanofiber has an average diameter of 0.5 to 500 nm.

17. The process for producing a carbon fiber composite material according to claim 11, wherein the dispersing step is carried out in accordance with an open-roll method using two rolls with a roll distance of 0.5 mm or less.

18. The process for producing a carbon fiber composite material according to claim 17, wherein the two rolls have their surface velocity ratio of 1.05 to 3.00.

19. The process for producing a carbon fiber composite material according to claim 11, wherein the

dispersing step is carried out by a closed kneading method with a rotor distance of 1 mm or less.

20. The process for producing a carbon fiber composite material according to claim 11, wherein the dispersing step is carried out by a multi-screw extruding kneading method with a screw distance of 0.3 mm or less.

21. The process for producing a carbon fiber composite material according to claim 11, wherein the dispersing step is carried out at a temperature of 0 to 50°C.

22. The process for producing a carbon fiber composite material according to any one of claim 11, further comprising a step of crosslinking the elastomer in the composite material after the dispersing step.

23. The carbon fiber composite material according to claim 7, wherein the elastomer in the composite material is in its uncrosslinked form and the composite material has a flow temperature higher than the inherent flowing temperature of the elastomer by 20°C or more.

24. The carbon fiber composite material according to claim 7, wherein the carbon nanofiber has an average diameter of 0.5 to 500 nm.

25. The carbon fiber composite material according to claim 8, wherein the elastomer in the composite material is in its uncrosslinked form and the composite material has a flow temperature higher than the inherent flowing temperature of the elastomer by 20°C or more.

26. The carbon fiber composite material according to claim 8, wherein the carbon nanofiber has an average diameter of 0.5 to 500 nm.